

Preparation of chitosan nanoparticles loaded by tramadol using ionic gelation method

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Background and Aims: Biodegradable hydrogel nanoparticles (nanogels) are among the most promising nanoparticulate drug delivery systems owing to their small and controllable sizes, very high hydrophilicity, ease of preparation and handling and remarkable biocompatibility. Chitosan-based nanoparticles have attracted a lot of attention upon their biological properties such as biodegradability, biocompatibility and bioadhesion.

Methods: In this study, a simple method based on ionotropic gelation was set up for preparation of chitosan-based nanogels for encapsulation of tramadol. Drug was dispersed in TPP solution before adding to chitosan solution. Drug-containing nanoparticles were prepared with different amounts of drug. Mean sizes of nanoparticles were between 250 to 262 nm. Value of loading ratio and loading efficiency were between 10-30% for prepared nanoparticles.

Results: The optimum condition for nanogels production was found to be: pH of chitosan solution 4.8, Chitosan concentration 0.12% (w/v), TPP concentration 1.17% (w/v), addition time of TPP solution to chitosan solution 1.52 min and temperature 10.33 °C and the optimum drug concentration was 1% (weight/weight).

Conclusions: At last, the ionotropic gelation method was optimized for drug-loaded nanogel preparation.

Keywords: Hydrogel; Chitosan; Loading; Tramadol